

(12) UK Patent Application (19) GB (11) 2 342 703 (13) A

(43) Date of A Publication 19.04.2000

(21) Application No 9924510.2

(22) Date of Filing 15.10.1999

(30) Priority Data

(31) 19848043

(32) 17.10.1998

(33) DE

(71) Applicant(s)

Carl Freudenberg
Hoehnerweg 2-4, D-69469 Weinheim,
Federal Republic of Germany

(72) Inventor(s)

Volker Schroiff
Eberhard Bock

(74) Agent and/or Address for Service

J Y & G W Johnson
Kingsbourne House, 229-231 High Holborn, LONDON,
WC1V 7DP, United Kingdom

(51) INT CL⁷

F16J 15/06

(52) UK CL (Edition R)

F2B B1B B1G

(56) Documents Cited

GB 1086997 A

(58) Field of Search

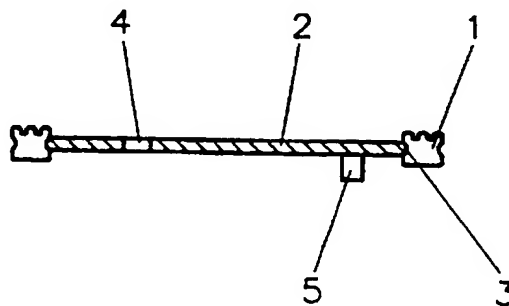
UK CL (Edition Q) F2B B1B B1G B1J B13F
INT CL⁶ F16J 15/06 15/08 15/10

(54) Abstract Title

Seal arrangement

(57) The invention relates to a seal arrangement having a seal (1) made from polymer material, in which arrangement the seal (1) is designed as a continuous frame which surrounds the support plate (2) on the side of the outer periphery and is connected to this support plate (2) in a form-fitting but releasable manner. The support plate (2) may have an aperture to engage the continuous frame seal on the outside. The seal (1) may have a recess (3) where it engages the support plate (2) to help in retaining it in position. The seal (1) can engage in a groove in a machine part and the groove may have an undercut (fig 10) that the seal (1) engages with when released from the support plate (2). The seal (1) and/or the machine part may have adhesive thereon to retain the seal in position (fig 2).

Fig.1



GB 2 342 703 A

Fig.1

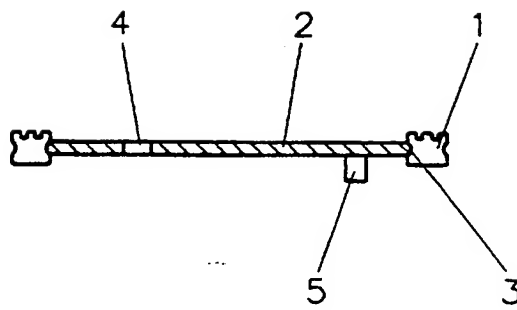


Fig.2

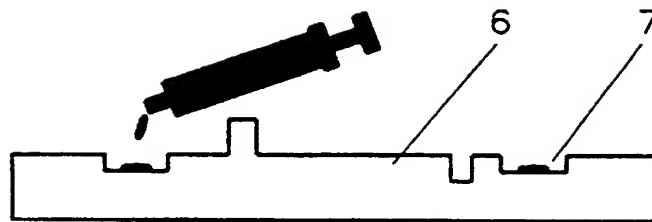


Fig.3

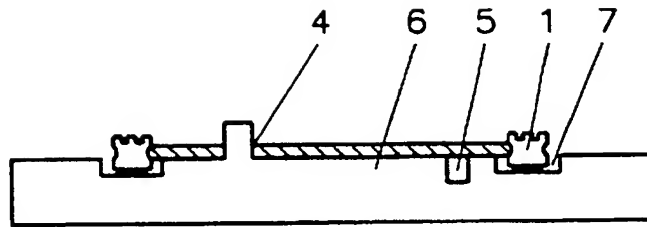


Fig.4

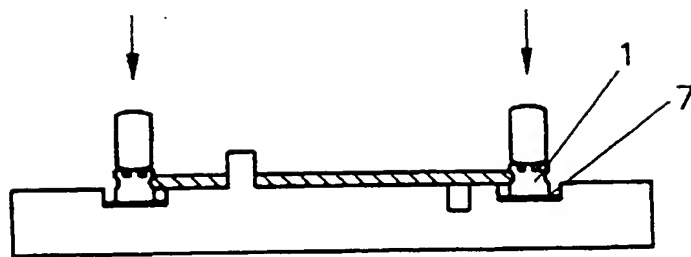


Fig.5

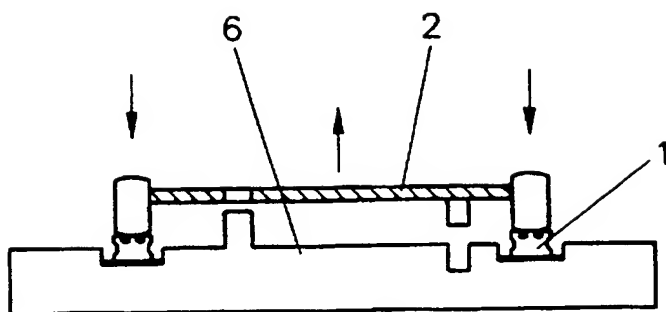
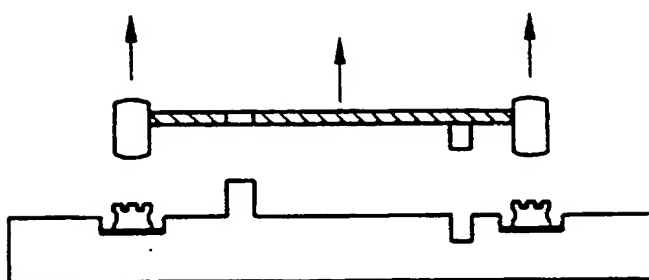


Fig.6



110

Fig. 7

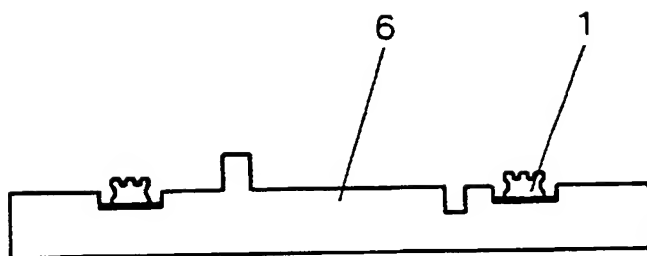


Fig.8

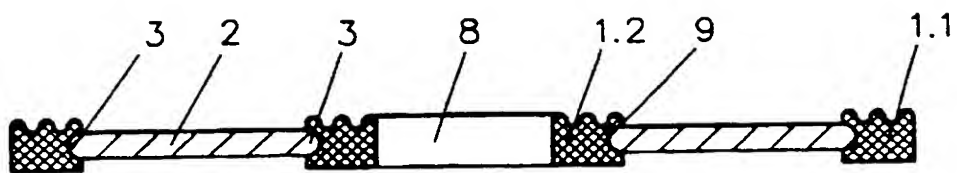


Fig.9

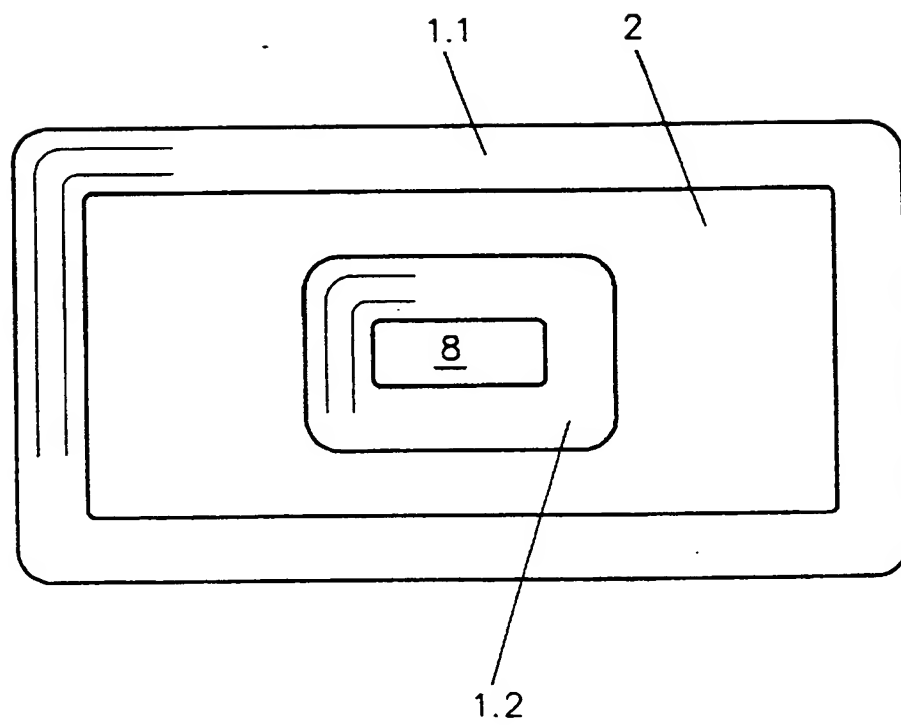


Fig.10

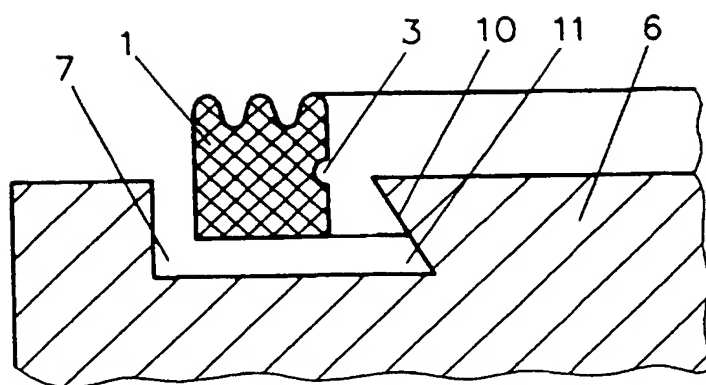


Fig.11

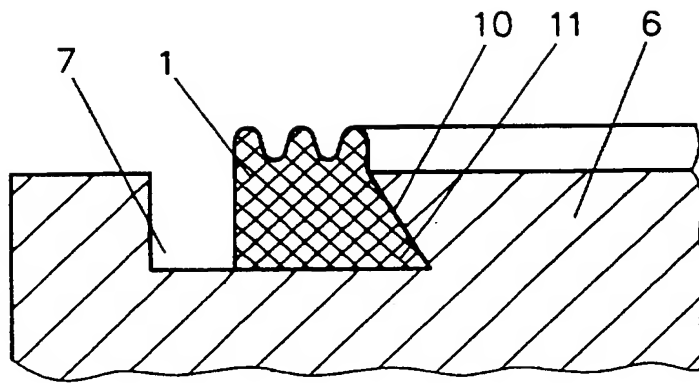


Fig.12

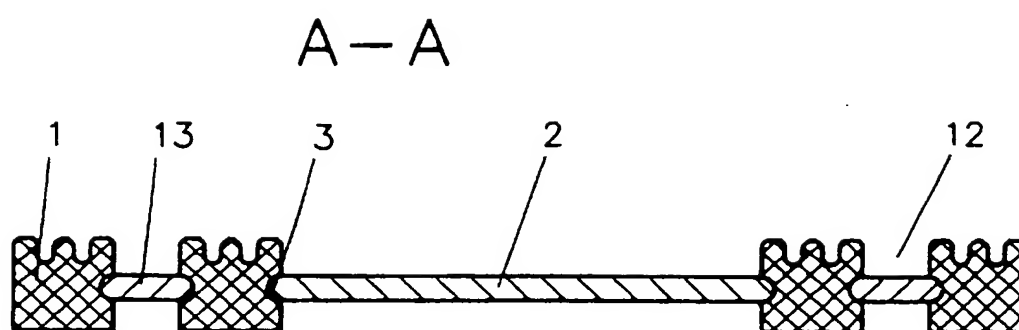
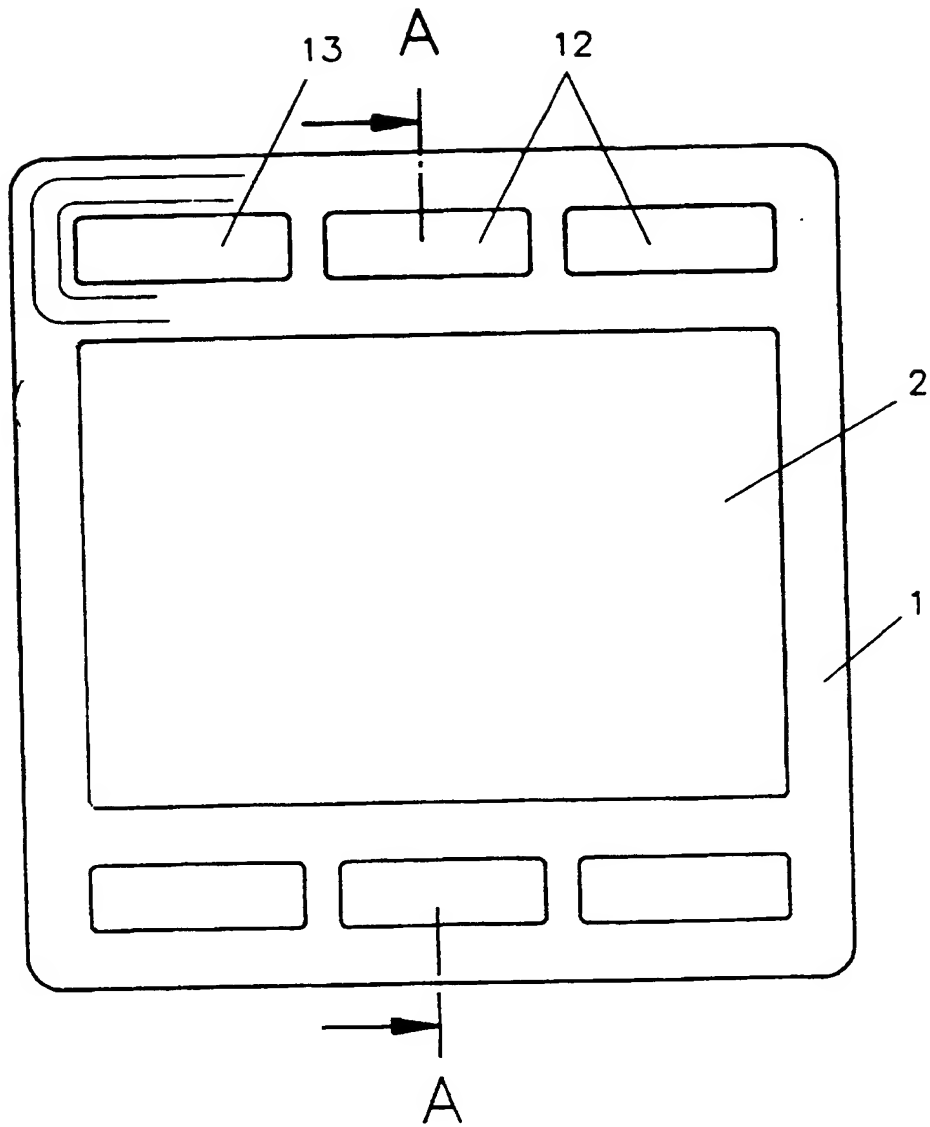


Fig.13



SEAL ARRANGEMENT

This invention relates to a seal arrangement having at least one seal made from polymer material and to a method for fitting this arrangement.

5 When sealing machine parts, such as for example valve covers for motor vehicle engines, bipolar plates for fuel cells, transmission casings or switching blocks of hydraulic control units, it is often necessary for a seal to be positioned very accurately between planar plates, flanges
10 which are to be sealed and/or in a groove.

In this context, in particular the fitting of seals with a high length to diameter ratio has proven extremely problematical and, despite considerable manual effort, often leads to incorrect fitting.

15 It is an aim of the invention to develop a seal arrangement which allows problem-free transportation and simple fitting of a seal with a high length to diameter ratio, of at least 10:1, and a method for fitting this arrangement.

20 Accordingly, from a first aspect, the present invention provides a seal arrangement having at least one seal made from polymer material, wherein the seal is designed as a continuous frame, surrounds a support plate on the side of the outer periphery thereof and is connected to
25 this support plate in a form-fitting but releasable manner.

From a second aspect, the invention provides a seal arrangement having a seal made from polymer material, wherein the seal is designed as a continuous frame, is arranged in an aperture in a support plate, and is connected
30 to the edge which delimits the aperture, on the side of the outer periphery thereof, in a form-fitting but releasable manner.

The support plate automatically fixes the seal in the form in which it was produced both during transport, for example from the production site to the fitting site, and during fitting, thus preventing distortion of the seal.

5 The seal may be provided with a groove-like recess which is open towards the support plate and is preferably congruent with respect to the peripheral-side edge of the support plate. This groove-like recess ensures that there is a form-fitting connection between seal and support plate
10 during transport. There is thus no possibility of unintentional separation of seal and support plate.

The support plate may be provided with centring holes and/or centring pins which, during fitting of the seal arrangement, make it easier to position the seal on the
15 machine part which is to be sealed.

In order to produce seal arrangements which are as inexpensive as possible, the support plate may be made from a plastic. In order nevertheless, when the support plate is to be reused frequently, to ensure suitable stability of the
20 centring holes arranged in the support plate and/or the centring pins, the centring holes and/or centring pins, in contrast to the support plate, may be made from a metallic material and be arranged as inserts in the support plate.

In order to accommodate the seal, the machine part
25 which is to be sealed may have a continuous groove, the inner delimiting wall of the groove having an undercut into which the seal can be latched after it has been removed from the support plate. An advantage of this is that the seal can be fitted on the machine part which is to be sealed without
30 an adhesive and is prevented from shifting inside the groove and/or from falling out of the groove only by the undercut. Owing to production conditions, a seal which surrounds the support plate on the outer peripheral side exhibits shrinkage stresses which arise while the polymer material is

moulded onto the outer peripheral edge of the support plate and during the subsequent solidification. Following insertion of the seal into the groove and removal of the support plate, the seal latches automatically, as a result of shrinkage stresses, into the undercut, and is thus held securely in position.

From a third aspect, the present invention provides a method for fitting a seal arrangement as defined above, wherein the seal and/or the machine part which is to be sealed are provided, on the sides which face towards one another, with an adhesive, the seal and the machine part are bonded together, and the support plate is released and removed from the seal which has been adhesively bonded to the machine part. The support plate can then be returned to the production process and reused.

Due to the adhesive bonding between seal and machine part, the seal cannot slip or become detached prematurely from the machine part.

Depending on the particular requirement, during fitting the seal may also be fixed in a groove which is provided for this purpose in the machine part which is to be sealed. The seal, after it has been removed from the support plate, preferably latches automatically into the undercut. It is then possible to dispense with the adhesive bonding.

The invention will now be described in more detail, by way of example only, and with reference to the accompanying drawings, in which:

Figures 1 to 7 show a diagrammatically depicted first embodiment of a seal arrangement having a seal made from polymer material, as well as a fitting method;

Figures 8 and 9 show a second embodiment of seal arrangement;

Figures 10 and 11 show part of a machine part which is to be sealed, with a groove which has an undercut; and

Figures 12 and 13 show a third embodiment of the seal arrangement according to the invention.

5 Figure 1 shows a cross section through a seal arrangement having a seal 1 made from polymer material. The seal 1 is designed as a continuous frame and surrounds a support plate 2 on the peripheral side. On the inside, the seal 1 has a groove-like recess 3 which is congruent with
10 respect to the circumferential-side edge of the support plate 2. Support plate 2 and seal 1 are connected to one another in a form-fitting but releasable manner. The support plate 2 has a centring hole 4 and a centring pin 5 and may be made from a plastic or a metal.

15 Figure 2 shows the first method step for fitting the above-described seal arrangement on a machine part 6 which is to be sealed, in which step a groove 7 which is arranged in the machine part 6 is provided with an adhesive. As an alternative, the adhesive may be applied to the seal.

20 As shown in Figure 3, in a second method step the seal arrangement is centred on the machine part 6 with the aid of the centring hole 4 and the centring pin 5 in such a way that the seal 1 is arranged in the grooves 7 which are provided for this purpose.

25 Figure 4 shows how the seal 1 is fixed in the grooves 7 with the aid of the adhesive.

In Figures 5 and 6, the support plate 2 is detached from the seal 1, which has been bonded to the machine part 6, and is removed.

30 Figures 6 and 7 show the finished machine part 6, which has been provided with the seal 1.

Figures 8 and 9 show a second embodiment of the seal arrangement according to the invention, which is similar to the embodiment shown in Figure 1.

In this embodiment, the support plate 2 is of annular design and is connected to two seals 1.1, 1.2. The first seal 1.1 surrounds the support plate 2 on the side of the outer periphery, while the second seal 1.2 is surrounded on its outer periphery by the support plate 2. Both seals 1.1, 1.2 are designed as continuous frames and, on their mutually facing sides, each have groove-like recesses 3 which are open towards the support plate 2 and by means of which they are secured in a form-fitting but releasable manner on the support plate 2.

Fig. 9 shows a plan view of the seal arrangement shown in Figure 8. The annular design of the two seals 1.1, 1.2 and of the support plate 2 can be seen in this figure.

Figures 10 and 11 show part of a seal arrangement according to the invention, the machine part 6 which is to be sealed itself being provided with a continuous groove 7 which is intended to accommodate the seal 1. The seal 1 shown here has already surrounded a support plate 2, on the outer peripheral side, in a stressed manner. The inner delimiting wall 10 of the groove 7 has an undercut 11, into which the seal 1 can be latched, due to shrinkage, after it has been removed from the support plate 2. An advantage of such a design is that there is no need for secondary attachment means, such as for example an adhesive, in order to secure the seal 1 inside the groove 7. In this exemplary embodiment, the seal 1 is held in a form-fitting manner inside the groove.

Figure 11 shows the same area as Figure 10 after the seal has engaged in a form-fitting manner with the undercut 11.

Figures 12 and 13 show a further embodiment of a seal arrangement. Figure 12 shows a section A-A from Figure 13. The seal 1 as a whole is designed as a single part, recesses 12 being provided inside the seal in the area of two 5 opposite end sides, which recesses are filled by auxiliary bodies 13 during fitting of the seal 1. The function of the auxiliary bodies 13 corresponds to that of the support plate 2, the auxiliary bodies and the sealing lips which surround the auxiliary bodies being connected in a form-fitting but 10 releasable manner.

Figure 13 shows a plan view of the seal arrangement illustrated in Figure 12.

Claims

1. A seal arrangement having at least one seal made from polymer material, wherein the seal is designed as a continuous frame, surrounds a support plate on the side of the outer periphery thereof and is connected to this support plate in a form-fitting but releasable manner.
2. A seal arrangement having at least one seal made from polymer material, wherein the seal is designed as a continuous frame, is arranged in an aperture in a support plate, and is connected to an edge which delimits the aperture, on the side of the outer periphery thereof, in a form-fitting but releasable manner.
3. A seal arrangement according to claim 1 or 2, wherein the seal is provided with a groove-like recess which is open towards the support plate.
4. A seal arrangement according to claim 3, wherein the groove-like recess is essentially congruent with respect to the periphery-side edge of the support plate.
5. A seal arrangement according to any one of claims 1 to 4, wherein the support plate is provided with centring holes and/or centring pins.
6. A seal arrangement according to any one of claims 1 to 5, characterized in that the support plate is made from a plastic.
7. A seal arrangement according to claim 6, characterized in that the support plate has centring holes and/or centring pins made from metallic material.
8. A seal arrangement according to any one of claims 1 to 7, wherein the machine part which is to be sealed, in order to accommodate the seal, has a continuous groove, and

in that the inner delimiting wall of the groove has an undercut, into which the seal can be latched after it has been removed from the support plate.

9. A seal arrangement, substantially as described
5 herein with respect to Figures 1 to 7, 8 and 9, 10 and 11 or 12 and 13 of the accompanying drawings.

10. A method for fitting a seal arrangement according to any one of claims 1 to 9, wherein the seal and/or the machine part which is to be sealed are provided, on the
10 sides which face towards one another, with an adhesive, the seal and the machine part are bonded together, and the support plate is released and removed from the seal which has been adhesively bonded to the machine part.

11. A method according to claim 10, wherein the seal
15 is fixed in a groove which is provided for this purpose in the machine part which is to be sealed.

12. A method according to any one of claims 9 to 11, wherein the seal, after it has been removed from the support plate, latches automatically into the undercut.



Application No: GB 9924510.2
Claims searched: 1-12

Examiner: Guy Robinson
Date of search: 10 November 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): F2B

Int Cl (Ed.6): F16J 15/06, 15/08, 15/10

Other: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 1,086,997 Felt Products MFG Co.	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

THIS PAGE BLANK (USPTO)